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PATENT SPECIFICATION

NO DRAWINGS

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COMPLETE SPECIFICATION

Improvements relating to the Testing of Water for pH

I, ARTHUR THOMAS PALIN, "Brentwood,"
2 Main Road, Kanton Bank Foot, Newcastle
upon Tyne, 3, British subject, do hereby
declare the invention, for which I pray that a
patent may be granted to me, and the method
by which it is to be performed, to be particu-
larly described in and by the following state-
ment:—

In connection with the treatment of water
for instance at swimming pools and water-
works it is desirable to know the pH value of
the water. In measuring these pH values use
is made of the fact that certain dyes known as
indicators change their colour in definite and
reproducible manner and degree according to
the pH value of the solution with which they
are mixed. Thus the addition of an appro-
priate indicator to the sample of the water
being tested results in the development of a
colour which, by matching against the colours
of buffer solutions of known pH which con-
tain an equal concentration of the same indi-
cator, permits of the pH value of the water
being determined except in the case of dis-
tilled water and waters of low buffer capacity
to which colorimetric methods of determining
pH are not normally applicable. In some cir-
cumstances it may be more convenient to com-
pare the colour of the mixture of indicator
and water with permanent coloured glasses
which have been standardized against buffer
solutions containing indicator.

In the preparation of indicator solutions it
is the standard practice to adjust the pH of
the solution by the addition of an acid or an
alkali to a value corresponding approximately
to the mid-point of the pH range for the parti-
cular indicator concerned, so that the pH of
the indicator solution does not then appreci-
ably affect the result obtained for the water
being tested.

In such colorimetric procedures interference
is caused by the presence of oxidizing agents
such as free chlorine in the water being tested,
because the indicator becomes bleached or its
colour is modified in some way. Comparison
with the colour standards may then give results

which are subject to significant error, or the
differences in hue between the colours being
matched may be so pronounced as to make
the comparison difficult or impossible.

A method previously used to overcome this
interference consists in adding either before
or with the indicator a quantity of a substance
such as sodium thiosulphate able to reduce or
neutralize the free chlorine or other oxidizing
agent so that it may be destroyed before the
indicator is affected. Such a procedure is not
entirely satisfactory because there remains the
possibility that the reducing or neutralizing
substance added may influence the pH of the
water to an undesirable extent so that the pH
value obtained may not reliably represent the
pH value of the original water sample.

I have found that this defect may be
entirely or largely overcome by adding to the
sodium thiosulphate or other reducing or
neutralizing agent a quantity of an acid or
alkali sufficient to adjust the pH of the solu-
tion of said agent to the same value as that of
the indicator solution with which it is to be
used. When so modified an amount of the
reducing or neutralizing agent sufficient to
destroy such amounts of free chlorine or other
oxidizing agent as are normally encountered
in water treatment may be added without
significantly affecting the accuracy of the pH
test except in the cases aforementioned where
colorimetric procedures are not applicable.

In conformity with this discovery my inven-
tion may be said to reside in a colorimetric
method of testing the pH of water containing
free chlorine, free bromine, free chlorine di-
oxide or other oxidizing agent, the method
comprising the addition of water, before or
with the pH indicator or indicator mixture, of
a reducing agent such as sodium thiosulphate
to which has been added an acid such as
hydrochloric acid or an alkali such as sodium
hydroxide sufficient to adjust the pH of the
solution of the reducing agent approximately
to that of the mid-point of the pH range of
the particular indicator or mixture of indi-
cators concerned so that the application of the

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reducing agent in the required amount enables the pH value to be determined by colorimetric means without significant interference from any free chlorine or other oxidizing agent originally present in the water.

5 Among the indicators which may be used are cresol red, cresol purple, thymol blue, bromo phenol blue, bromo cresol green, methyl red, chloro phenol red, bromo cresol purple, 10 bromo thymol blue, phenol red or diphenol purple.

15 The reducing agent may consist of or include a thiosulphate, for example sodium thiosulphate, or an arsenite, for example sodium arsenite or a sulphite, for example sodium sulphite.

20 Instead of using the indicator or indicators and the reducing agent in the form of separate solutions of known strength it may be advantageous to combine them together as mixtures in solution, powder or tablet form.

EXAMPLE

25 A suitable mixture for the determination of the pH of a chlorinated water using phenol red as indicator may be prepared as follows:—

30 Moisten 0.1 gram of phenol red with about 2 ml. of ethyl alcohol in a glass mortar, rub up with 5.7 ml. of 0.05 N sodium hydroxide solution and dilute with distilled water to 25 ml. To this indicator solution add 200 ml. of 0.5% sodium thiosulphate solution and make up with distilled water to a volume of 250 ml. Finally adjust the pH to approximately the mid-point of the range 6.8 to 8.4 by the addition of 0.02 N acid or alkali.

WHAT I CLAIM IS:—

1. A method for testing the pH of water containing an oxidizing agent for example free chlorine, free bromine or free chlorine dioxide, comprising the addition of a reducing agent 40 to the water before or with the pH indicator, to which reducing agent has been added an acid or an alkali sufficient to adjust the pH of its solution to a value corresponding approximately to the mid-point of the pH 45 range of the particular indicator concerned, the amount of said reducing agent added to the water being sufficient to overcome any interference caused by the oxidizing agent bleaching or modifying in some way the colour 50 produced by the indicator.

2. A method according to Claim 1 wherein the indicator consists of or includes cresol red, cresol purple, thymol blue, bromo phenol blue, bromo cresol green, methyl red, chloro phenol red, bromo cresol purple, bromo thymol blue, phenol red or diphenol purple. 55

3. A method according to Claim 1 wherein the reducing agent consists of or includes a thiosulphate, for example sodium thiosulphate, an arsenite, for example sodium arsenite or a sulphite, for example sodium sulphite. 60

4. A method as claimed in any of Claims 1 to 3 wherein the indicator and the reducing agent are mixed together and added in solution, powder or tablet form. 65

5. The method for the testing of the pH value of water containing oxidizing agents substantially as hereinbefore described.

A. T. PALIN.